Phytologia (August 1997) 83(2):102-108.

HISTORICAL NOTES ON LOUISIANA PRAIRIES: SIZE CHANGES IN A CENTURY AND A HALF

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ABSTRACT

Using land survey records and aerial photographs, we assessed prairie size changes on the Winn Ranger District of the Kisatchie National Forest. Prairie has been lost mainly by conversion to agricultural uses and by woody invasion. Over 90 percent of prairie present in 1835 is now gone, and over 50 percent of the prairie present in 1940 is gone.

KEY WORDS: prairie, Kisatchie National Forest, Louisiana, woody invasion, ecology

INTRODUCTION

Numerous observations show that in the absence of naturally occurring "disturbances" — for example, periodic fire — grasslands are encroached by woody species largely from the edges. Eventually, prairies convert to shrublands or forests. In areas with low precipitation conversion to woody vegetation is slow, but in wetter areas it can occur rapidly, often in a few decades (Sauer 1950; DeSelm & Murdock 1993). There are many documented instances of prairies being lost to woody vegetation.

In a Wisconsin prairie, Chavennes (1941) noted a 50% decrease in area in 25 years. Smith (1983) observed a 33% reduction of a Tennessee prairie in 43 years. Annala & Kapustka (1983) and Annala *et al.* (1983) observed a loss of between 47% and 66% in Ohio prairies in 33 years. Bragg & Hulbert (1976) found a 34% loss in 32 years in Kansas prairies. Penfound (1964) noted rapid loss in thirteen years in midwest prairies and estimated that only 35 years would be necessary to convert

grasslands to woodlands. Nyboer (1981) and Gleason (1913, 1922) noted rapid invasion of woody species in previously heavily grazed prairies in Illinois. Kucera (1960) recorded rapid invasion of a Missouri prairie, and Moran *et al.* (1997) found a 60-80% decrease in Mississippi Blackland prairies in the period 1936 to 1989.

In presettlement times, small, isolated prairies were an integral part of north and central Louisiana (MacRoberts & MacRoberts 1997a, 1997b, 1997c). These, like the Blackland Prairies of Alabama, Arkansas, and Mississippi, are southeastern "outliers" of the vast prairie that runs from Texas to Canada (Rostlund 1957; Foti 1989; Irving *et al.* 1980; DeSelm & Murdock 1993; Kucera 1992). Like most southeastern prairies, the central and northern Louisiana calcareous prairies were generally small, the largest being about five square miles in area (MacRoberts & MacRoberts 1997b). Floristically these outliers are classifiable as tallgrass prairies with such characteristic grasses as *Andropogon gerardii* Vitman, *Panicum virgatum* L., *Schizachyrium scoparium* (Michx.) Nash, *Sorghastrum nutans* (L.) Nash, and *Sporobolus asper* (Michx.) Kunth. Families especially well represented are the Apiaceae, Asteraceae, Fabaceae, Lamiaceae, Rosaceae, and Scrophulariaceae (Smith *et al.* 1989; MacRoberts & MacRoberts 1995, 1996a, 1996b, 1997a).

Almost all presettlement prairies in the southeastern United States have been destroyed (DeSelm & Murdock 1993): less than one percent of Louisiana prairies remain (Allen & Vidrine 1989; MacRoberts & MacRoberts 1997b, 1997c; Thomas 1986). The most intact extant Louisiana prairies occur on the Winn Ranger District of the Kisatchie National Forest in Winn and Grant parishes. These prairies are inclusions in the Shortleaf Pine/Oak-hickory Forest (Allen 1993; Smith *et al.* 1989; MacRoberts & MacRoberts 1996b).

The Winn District has two groups of prairies. The northern group, about 13 km west of Winnfield, is known as the Keiffer Prairies (Smith *et al.* 1989). These presently consist of about 45 openings, which range from approximately 0.2 to 6.0 ha and total about 70 ha (Smith *et al.* 1989). The southern group, the Packton Prairies, occurs 18 km south of Winnfield. These five prairies range from about 0.4 to 5.0 ha and total about 15 ha (MacRoberts & MacRoberts 1996a).

The early land-use history of these prairies is not known in detail. Bison and Native Americans were eliminated from Louisiana in the first half of the nineteenth century (Lowery 1974), when domestic cattle and Europeans came in. The prairies were grazed until the 1970's and undoubtedly grazing was often heavy (Smith *et al.* 1989). One of the Packton prairies was heavily grazed in 1996 (and probably in previous years). A few of the prairies were farmed for hay at least up until the 1940's. Most were apparently never plowed (Smith *et al.* 1989). How extensive fire suppression was in the last century is not known, but by the second half of the twentieth century it was standard forestry practice. The two largest prairies on the Winn District were converted to pine plantations and no longer exist (part of one of these, Tancock's Prairie, is on private land).

Although nineteenth and early twentieth century travelers and botanists knew of these prairies (Smith *et al.* 1989; MacRoberts & MacRoberts 1997b), almost nothing was known about them until the 1980's. Consequently, only land survey records and aerial photographs are useful in determining size.

METHODS

Land Survey Records: Because surveyors recorded prairies, the plat and field notes of the 1832-1836 land surveys of what is now the Winn District were examined. These plats were found to contain both detailed drawings of the prairies crossed by section lines and field notes on their exact dimensions.

Five Keiffer prairies are shown on surveyors' plats and described in the survey notes by one survey line (Milam [12-2], Carpenter Road [8-5], Donna's [5-1], Upper Range Creek [1-1 through 1-5], Upper Range Creek [1-6 through 1-9]). One prairie (Keiffer [3-1 through 3-5]) falls on a corner; there are two directions for it. Thus, there are seven measurements given for the land surveys for six of the Keiffer prairies, which can be compared directly with current prairie measurements. In the Packton group, there are four land survey measurements for Tancock Prairie and three for Bartram's Prairie. In all, there are fourteen measurements from the 1830's.

Aerial Photographs: Prairies have distinctive signatures on aerial photographs. Using the earliest aerial photographs (1940) and comparing them with the most recent (1991), we have been able to compare prairie size changes over the past half century. We surveyed all the Winn District prairies to determine current condition and to ensure that we were dealing with a prairie and not some other surface feature (MacRoberts & MacRoberts 1996a). For this work we used a randomly selected sample of sixteen prairie openings from the Keiffer group. We have included no prairie in this sample that has been obliterated by direct mechanical means; only a few in the Keiffer group have been so destroyed since the 1940's.

We photocopied aerial photographs, adjusting for possible differences in scale by using obvious landmarks, and measured actual area by the cut and weigh method (Lind 1974) using a Mettler Analytical Balance adjusted to a standard sample.

RESULTS

Table 1 compares the land survey measurements of the 1830's with measurements taken from 1991 aerial photographs. Table 2 compares the size changes in the sample of prairies and prairie complexes between 1940 and 1991. Since personal equations will always lead to slightly different size measurements, the important measure here is the percent change.

Table 1. Land survey measurements of prairies in the 1830's and modern equivalents in meters and percent change.

Prairie Name	1830	1991	Change %
	KEIFFER PRAIRIES		
1-1 (Upper Range Creek)	570	70	-88
1-7 (Upper Range Creek)	270	110	-60
3-3 (Keiffer N-S)	1210	250	-79
3-3 (Keiffer E-W)	960	190	-80
5-1 (Donna's)	210	46	-78
8-5 (Carpenter Rd. East)	290	290	none
12-2 (Milam)	220	110	-50
	PACKTON PRAIRIES		
Tancock's Prairie	1010	0	-100
Tancock's Prairie	390	0	-100
Tancock's Prairie	790	0	-100
Tancock's Prairie	740	0	-100
Bartram's Prairie	595	0	-100
Bartram's Prairie	2728	0	-100
Bartram's Prairie	1445	0	-100
Total	11428	1066	-91

Table 2. Size changes in hectares and percent in samples of prairies and prairie complexes: 1940-1991.

Prairie	1940	1991	% Change
1-1 & 2 (Upper Range)	1.39	0.66	-53
1-6,7,8 (Upper Range)	6.87	2.75	-60
2-1 (Coldwater)	7.97	5.50	-37
5-1 (Donna's)	1.02	0.34	-67
5-2 (Donna's)	3.00	0.78	-74
6-1 (Bright Rd.)	7.95	3.45	-57
7-1 (Carpenter Rd.)	3.47	1.93	-44
8-1 (Carpenter Rd. East)	0.75	0.35	-49
8-5 (Carpenter Rd. East)	4.79	3.08	-38
9-3 (Little Rock Creek)	2.34	0.88	-62
10-1 (Long)	1.74	0.66	-64
12-1 & 2 (Milam Branch)	9.23	5.40	-42
Totals:	50.52	24.78	-51

DISCUSSION/CONCLUSIONS

In historic times, there has been a dramatic loss of prairie throughout the United States. Less than one tenth of one percent remains (Whitney 1994; Noss 1997). This also holds true for Louisiana where there was once extensive prairie in the southern part of the state and many small isolated prairies in the central and northern parts of the state. Some of the most intact prairie remaining in Louisiana occurs on the Winn District of the Kisatchie National Forest where perhaps as much as 85 ha still exist. However, when the land surveys were done in the 1830s, there was much more prairie, of which approximately 91% has been lost. Much of this loss was due to conversion of prairie to other uses, largely farming and forestry. But the loss continues. Since 1940, about 51% has been lost to woody invasion. No prairie has either increased in size or remained stable. These loss rates are comparable to the loss of prairie taking place in other parts of the United States.

ACKNOWLEDGMENTS

The work was supported in part by cost-share agreements with the Kisatchie National Forest. Part of the expenses for herbarium, archival, and field work was provided by a grant, "Survey of Keiffer/Packton (LA) Prairies", Project Number 97-073-030, from the National Fish and Wildlife Foundation's Wildlife and Habitat Management Initiative and the Native Plant Conservation Initiative to the Kisatchie National Forest. John M. Anderson, Map Librarian, Department of Geography and Anthropology, LSU, was instrumental in obtaining aerial photographs and land plats of the Winn prairies. The staff of the Hill Memorial Library, LSU, aided with maps and papers. David C. Moore, Louisiana Natural Heritage Program, aided with obtaining aerial photographs and maps. Beverly Burden, Biology Department, LSUS, aided with measuring prairies. Discussions with Tom Foti benefited our understanding of prairies. Charles Allen and R. Dale Thomas, Biology Department, NLU, reviewed an earlier version of the paper.

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